Water Infrastructure Risk Assessment

Increasing Security and Reliability by Design

Background

National and international security challenges have shifted since the end of the cold war. Scarcity of arable land, water, and other basic resources is recognized as a critical component of regional security in many areas around the world. Water resources and the associated supply, treatment, and distribution infrastructures are important elements of national security and face a spectrum of threats. According to the President's Commission on Critical Infrastructure Protection, the nation is so dependent on our infrastructures that we must view them through a national security lens. They are essential to the nation's security, economic health, and social well-being. Recent threats and isolated attacks on the water distribution system suggest a trend that could put our water infrastructure at risk. Foreign governments, disgruntled employees, terrorist groups, transnational crime syndicates, and vandals all pose potential threats to our nation's water systems. Recent events include:

Improving the safety, security, and reliability of our water infrastructure

- A pesticide intentionally injected into a water main.
- Cults culturing salmonella in their own laboratories.
- The discovery of easily cultured chlorine-resistant microorganisms.

Historically, the intentional contamination of enemy water supplies has been fairly common. In the recent Kosovo war, Yugoslavian forces are suspected of contaminating 70 percent of the existing wells.

The U.S. water infrastructure badly needs:

- A systematic analysis of existing and emerging threats.
- Development and use of risk assessment tools to identify the most critical vulnerabilities.
- Security system upgrades to protect critical assets and to rapidly detect contamination.

Approach

The Security Systems and Technology Center of Sandia National Laboratories has the experience and resources to address the needs of the water infrastructure. From nuclear weapons to large federal dams, Sandia has been the lead laboratory for the U.S. Department of Energy providing security solutions for our nation's most critical assets. Systematic, performance-based, risk assessment methodologies developed and refined over the last 25 years are being adapted for use on the water infrastructure.

Entry control systems

In partnership with the Environmental Protection Agency, water industry associations, and water utilities, Sandia is developing a comprehensive program for protecting the water infrastructure. Activities currently underway include:

- Workshops for training water utility personnel in security risk assessment tools and technologies.
- Development of generic methodologies to facilitate widespread application by water utilities.
- Security experts assessment and characterization of specific water utility sites.
- Assessment of the vulnerabilities in automated control systems to cyber attack.

Research and Existing Projects

Sandia's security risk assessment processes have already been adapted to several critical components of the water infrastructure. Research into real-time active management systems for water quality monitoring, which will become an important component of total system security, is underway. Examples of Sandia's efforts include:

Federal dams

- Adapted security assessment tools developed for the nation's critical assets to assess large federal dams.
- Completed comprehensive assessments on three major facilities.
- Developing a Field Manual and Training Program for facility owners.

Large federal dam security assessment program

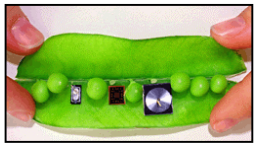
Water supply, treatment, and distribution

- Completed an assessment of a small water utility system.
- Presently completing an assessment on a large municipal system.
- Developed and presented a workshop to train water utility managers on systematic risk assessment methodologies.
- Working to integrate the cyber and physical security assessment processes.
- Developing these processes in cooperation with water utilities across the U.S.

Distribution system security

Active Management Systems

- Research underway for continuous monitoring of several Environmental Protection Agency regulated contaminants.
- Adapting proven microsystems techniques to detection of chemical/biological agents in water.



Microsystems for continuous monitoring of water quality

Related Sandia Water Activities

This is one component of Sandia's Water Safety, Security, and Sustainability Initiative. Other areas include: Water Quality, Water Quantity, Water Use Management, and International Water.

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